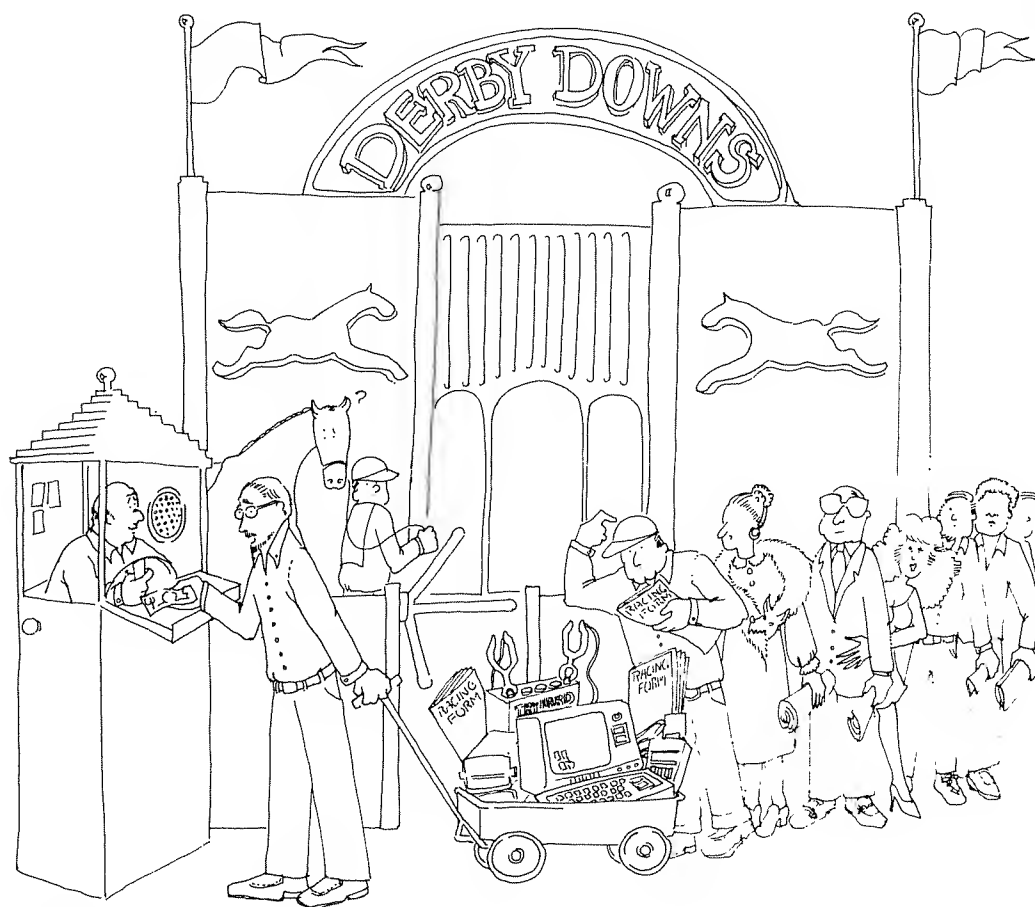


INAUGURAL
ISSUE

Computers & Gambling Magazine

Vol. 1 No. 1



“What do you mean the computer has to pay admission?”

Inside:

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.START; Publisher's Comments ; by M. R. Downing

Thank-you for your interest! Why did I start this magazine? I often ask myself that question! The reason is that analysis of gambling systems is the reason I bought my computer. Every time I meet a computer programmer he either has personal experience in this area or knows someone who has. Apparently computer analysis of horse racing, card games, sports betting, stock and future market speculation, etc., is very popular among computer enthusiasts. However, you will find little published about their efforts. This magazine can fill that need. One thing I want to encourage is reader contribution. Send me material! If you have a product you wish to advertise send me a camera ready copy. I'm sure I can make you an offer you can't refuse regarding price.

After a lot of consideration and figuring I've decided to shoot for 4 issues in 1980, published quarterly. A subscription will be \$5.00 per year with a \$1.25 over the counter price on future issues. Well give this plan a try and see how we do. If computerized gamblers and speculators like it we can publish more often.

Its been a long time since my advertising campaign began and some people have waited a long while. I did not receive a single complaint over the long months. This means that I've drawn together a lot of good people interested in computing. Thanks again and I hope to hear from you.

Please address all correspondence inquiries to:
JOE COMPUTER
22713 Ventura Blvd., Ste. F
Woodland Hills, CA 91364

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NEWS . .

SDL's Program *Pro Football* has made its television debut in Los Angeles. KBSC-TV channel 52's Friday evening show "Super Fan on Sports" demonstrated the accuracy of Ken Perry's Apple based program by predicting the outcome of the weekend's card. The program correctly predicted 8 out of the 14 games and beat Las Vegas' line all the way. SDL has recently moved to the Los Angeles area from West Virginia and welcomes visitors to their Redondo Beach offices. The address is 2612 Artesia Blvd., Suite B. Their ad appears on page 10.

I received an interesting letter from Jack Williams of Fredericksburg, Virginia. He started a quarterly journal for people interested in using micro-computers to maximize profits in "...stocks, bonds, warrants, stock options, commodities..." He has an interesting subscription plan. A participating membership is \$30.00 per year. This means that you promise to contribute at least one publishable article per year. A non-participating membership is \$300.00 per year. What really interest me are some of the articles which have thus far been published, such things as "Multiple Correlation Theory and Practice" and "Market Prediction Synthesis." For more info see the ad below.

Computers and Gambling Magazine is published as often as quarterly by Joe Computer, 22713 Ventura Blvd., Suite F, Woodland Hills, CA 91364.

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Artwork Roberta Roberts

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LETTERS . .

Dear Sir:

I am very interested in your upcoming newsletter on gambling systems as analyzed by computer. For two years now I have been studying handicapping of thoroughbreds and for one year have been trying to formulate algorithms for computer analysis.

I have already written one program for the computation of a rather involved speed rating for horses based on past performances. Today, I completed a program which prints out combinations for betting the trifecta, based on a system that I devised to try to optimize multiple wagers. However, my major program will be a comprehensive effort using multiple regression techniques as well as speed ratings, and the simultaneous monitoring of several spot systems. Many hundreds of bytes of data will be stored on disk files for each horse, permitting complex correlations and calculations which are practically impossible to arrive at by hand. These files will be updated each time they are used.

It will be some time before my main programs are written. In the meantime, I would greatly appreciate your newsletter for some feedback in this area — which for me has been a one-man effort. As you see, I am largely interested in horse handicapping systems, but I also find it useful to study gambling systems in general. So far it appears that strictly mechanical systems (often incremental) commonly used in many types of gambling, offer little hope. This is why I am concentrating on the horses where I feel that statistics and computers can truly take some of the gamble out of gambling.

Please put my name on your mailing list. Enclosed is \$1 for the first issue.

Stephen Hoke
New York, New York

Dear Sir:

I noticed your ad under the "Attention Gamblers" heading in the August '79 *Byte Magazine*. My interest in your proposed format centers around the simulation (on microcomputers) of poker competition, including:

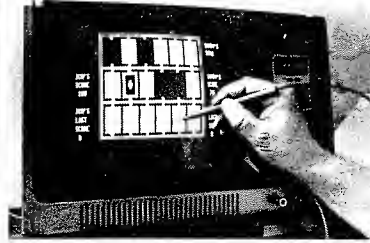
- 1) Identification of weak, strong and breakeven strategies (for various games),
- 2) General application of game theory to personal (psychological) conflict situations,
- 3) Mathematical quantification of the elements leading to strong or weak play,
- 4) and primarily, the development of a computer-based teaching system for several popular poker games (razz, 7-stud, hold-em, etc.), including play against opponents and a print-out evaluation of the students play of each hand.

1), 2), and 3) are in progress. 4) is still a dream.

Enclosed is a check of \$1 for the first edition. I'll reserve comment on subscription price since my interests are rather specialized and unlikely to find much appeal to the bulk of your respondents whom, I would expect, will tend toward market trading analysis.

Dr. Charles M. Mohr
Idaho Falls, Idaho

Letters continued on Page 13

SOFTWARE
FOR THE TRS-80*

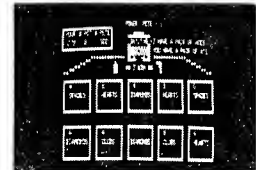
NOW!
A LIGHT PEN
FOR THE TRS-80
AND
SOFTWARE
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QS LIGHT PEN. We have taken the excellent PhotoPoint light pen and packaged it with our own custom software. You get the light pen, which plugs into your tape recorder, and an instruction booklet that includes the software you need to interface a light pen to your own BASIC programs. Our software routines are in BASIC and a simple GOSUB puts the light pen in action. Two program examples are included. The "menu select" mode lets you set up selection squares anywhere you wish on the screen. The "screen location" mode searches for the pen position and returns the screen address to the calling program. One 9V battery required, not included. Light Pen — \$19.95

SKETCH-80™ by Bob Christiansen. Use the QS light pen to draw figures on the TRS-80 screen. Figures are drawn at three times normal size. Then save your sketch in memory and start another one. Your sketch can be displayed at normal size or at the enlarged size at which they were drawn. Combine two or more sketches on the same screen. Save your sketches to tape or disk. You can even ask the computer to print out the POKE values required to produce your sketch. This system program figures out how much memory your TRS-80 has and allocates storage accordingly. Requires level II, 16K. On cassette — \$14.95

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LOWBALL POKER by Danny Shea. How low can you go? It's you against Micro Molly and the lowest hand wins. That's the rule in lowball poker. This version plays the popular Gardena, California rules. Don't take her for granted — Molly plays an excellent game. Written in BASIC. On cassette — \$11.95

RUMMY MASTER by Dave Gubser. Play rummy against the computer. Exceptional graphics display your hand, the discards, and the cards that have been melded. You see your opponent shuffle and deal out the cards. Tested in an arcade, this program was a big hit. Written in BASIC. On cassette — \$11.95

MATCH CARDS by Danny Shea; **BANKSHOT** by Bob Christiansen. Two programs on one cassette. **MATCH CARDS** is a concentration-type game where you match numbers, letters, or graphic shapes. For 1 or 2 players. Automatic scoring rates your recall ability. Written in BASIC. **BANKSHOT** is a billiard-like game for those who think they know all the angles. Hit the ball into the pocket, but you must hit a wall first. Written in BASIC with machine language subroutines. Just CLOAD and RUN. For 1 or 2 players. On cassette — \$9.95

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OEBUG by Bob Pierce. Debug machine language programs by stepping through one Z 80 instruction at a time. Relocatable. Several display options. Multiple break points. Modifiable memory and registers. On cassette — \$14.95

Z-80 DISASSEMBLER by Vic Tolman. Decode machine language programs including TRS 80 ROM with this Z 80 Disassembler written in BASIC. Instruction mode prints out machine code and Zilog mnemonics in standard format. Or use the ASCII mode which converts machine language code to ASCII. On cassette — \$14.95



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MICRO- COMPUTERS IN THE FUTURES MARKET

by
Jeffrey A. Miller
Eugene, Oregon

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There seems to be a great deal of interest in applications for the personal computer in stock and futures market investment. Here is an article as first published in 80-US, the TRS-80 Journal.

With the value of the United States economy exceeding \$2 trillion dollars isn't it surprising how little is known about the "Futures Market"?

"Why?", you may ask!

Well, how about the little known fact that the value of all the futures market trading done in 1977 was an astounding \$1 trillion dollars! Yes, only half the value of the entire US economy. Not bad for the perennial black sheep of the investment world. In fact, futures markets often trade a greater dollar value of goods than the value of the stocks traded on all stock exchanges.

WHAT IS THE FUTURES MARKET?

The "futures markets" I refer to are also called "commodity exchanges" or "commodity futures markets" and exist all over the world. There are eleven separate commodity exchanges or futures markets in the United States alone. Plus there are several in London, Hong Kong and Sydney, Australia. Although the term "commodity" refers to any good that is bought and sold, we are concerned only with

those "commodities" traded on the organized exchanges. These range from the grain and meat (wheat, corn, soybeans, cattle, hogs, etc.) markets in Chicago to the food (coffee, cocoa, sugar, potatoes, orange juice, etc.) markets in New York to the international commodities traded all over the world, and back to Chicago and the financial (foreign currencies, gold, silver Treasury Bills, etc.) markets. There are also numerous smaller exchanges located in the US and other parts of the world where significant trading takes place in the grains, cotton, wool, sugar, coffee, cocoa, gold, silver and so forth.

The commodity futures markets developed for several basic reasons. One, like any market anywhere, the commodity futures markets set prices for their particular commodities. Farmers, elevator operators, bakers, packing houses, and other individuals can then use those "market prices" to set their own individual prices after adjusting the "price" to reflect quality differences, location differences, and time (of

delivery) differences. A second reason for their development is that, like stock exchanges, a commodity futures market is a mechanism to provide capital to the farmers, ranchers, bakers, packers and other participants. The market is only a mechanism because the capital (money) actually is obtained from the many speculators who must be present if the market is to operate efficiently.

Commodity futures exchanges operate much like the stock exchanges we are all familiar with. In the stock market though, people buy and sell...well, stocks! Of course there are warrants, options and bonds and government securities, etc. In the commodity futures markets, though, people don't buy and sell "commodities"! Rather, they buy and sell contracts, which require at some time in the future one person (the seller) to deliver a commodity and the other person (the buyer) to accept delivery and pay for the commodity. The two key words are, "future" and "contracts".

Buyers and sellers in the commodity futures markets actually buy and sell "futures

contracts". These contracts are real, legal contracts which can be enforced by the courts.

However, since each futures contract for any particular commodity is exactly like every other futures contract for that particular commodity except for the price, the contracts are easily exchanged. That is, if you buy a futures contract today, you can easily sell that contract tomorrow, next week, or even later today. Any change in the price which occurred between the time you bought a futures contract and the time you sell that contract represents your gain or loss, depending on the direction prices moved. It should be understood that this explanation of a commodity market is greatly oversimplified but the key concepts are here. Participants in the market generally refer to this activity as "futures trading", or as trading in the "futures market". This way it is clear they refer to futures and not the "actuals" or "cash" commodity markets where the physical commodities are bought and sold. There is a definite relationship between the cash markets and the futures markets but it is a dynamic relationship and not too easily defined.

Finally, since futures trading is actually trading "Futures contracts" it is just as easy to originally "sell" a contract and "buy" a contract and "sell" it later. The difference being, if you sell first, prices must decline in order for you to make a profit. If you buy first, prices must rise in order for you to make a profit. The idea then is that as a speculator you attempt to determine the probable direction of the prices and then buy or sell futures contracts, depending on the direction. Therein lies the rub. How does one determine the probably future direction of the prices? Unless you can foresee the future, the only alternative is to examine information about the markets to try and determine the most probable direction of price movement. This then, is the

crux of the matter. What means are available to allow individuals to examine large amounts of information quickly, easily, and accurately? The best answer to date is the "Micro" or personal computer. It might be useful to quickly review the development of the personal computer and examine its application to futures trading.

ENTER THE MICRO-COMPUTER

Some years back the electronics industry developed what they call the "microprocessor chip". These chips are the brains of all microcomputers. Not only have they reduced both the size and cost of micros but they make it possible for anyone to run one! In fact, you can purchase one for less money and learn to use it in less time than is required for many recreational activities. The system this article is based on cost less than \$1000 and yet does everything described there and much more!

What are the different kinds of micros currently available? The earliest were kits you had to put together. They generally appeal to the computer hobbyist. Today, there are several brands of "ready to run" computers. These include the TRS-80 (Radio Shack), the Commodore PET and Processor Technology SOL. My own, the one on which this article is based, is a TRS-80 with Level II and 16 K Ram.

FITTING THE MICRO TO THE TRADER

Generally the first step in choosing a system is determined by the traders needs. That is, how many commodities to follow and what data will be recorded for each?

The main point to be considered here is that one of the most expensive areas of any micro is in the memory. For this reason the trader should purchase a system which has only enough memory to do the job. There is an obvious trade-off here between time and money. The more money (memory) the less time it takes to perform a series of operations on large amounts of data. Our objective is to

strike a balance, sacrificing some time in order to save considerable money. The most important point here is to purchase a system capable of expanding as the individual's needs, sophistication & money increase. All the systems mentioned are expandable.

THE SOFTWARE

Once we've assembled our hardware (the computer and its peripherals-video screen, keyboard, cassette recorder, etc.) we turn our attention to the software. Software is computerese for "programs" or lists of step by step instructions for the computer. Without software even the most expensive computer is nothing but a hunk of junk. There are only two methods available to obtain software--write your own, or buy some! If you have the time and ability you can develop your own. Most of us though are better served by purchasing programs developed by skilled programmers. One such software package is the Commodity Market Analyst 1. or CMA1. published by MicroFutures Trading Co.

Software is also available from Commodity Concepts and others; if you buy the Comm Basic system it comes complete with software. CMA1. allows each trader to develop and test their own unique strategy. I simply do not believe anyone will sell a highly profitable "system" much less put it on tape for a micro. If they did, how profitable would it be when thousands of traders use it? A check of the ads in various computer or commodity magazines will indicate several individuals and firms, including those above, which sell packaged software or will develop custom software.

THE METHOD

Regardless of how you obtain your software there are still some important steps prior to our research efforts. These steps are 1) "debugging" the

(Continued on Page 6)

software; 2) "double checking" calculations and graphs; and 3) running the micro along with your old P & P (pencil and paper) method. The first step, "debugging", applies primarily to individually developed software or custom software. It is a technical term and usually refers to checking each possible routine to insure proper operation.

Generally, debugging should not be required on packaged software.

The second step, "double checking" is valuable for two reasons: one, it insures that calculations are correct and results are what the user expected; two, it allows the user to become thoroughly familiar with the operation of the programs. Double checking is done by simply "running" the program and entering data as required. Then the user compares the computer's results with those obtained using P & P and a hand calculator. The key to both debugging and double-checking is to use "phony" data. The final step is the most important and requires the most effort. It involves both your new computerized system and your old P & P method. Ideally, you should use both methods for several months under actual operating conditions. Using actual data the trader will be comparing computer results with P & P results. Once the trader is satisfied that the computer system is functioning properly and that the trader understands the computer's results then they can cease the P & P method. Be realistic, please! Don't perform step three following any more than one or two different commodities. Once the trader concludes step three expansion to any number of commodities is possible.

DATA BASE CONSTRUCTION

Now, we can construct our data base. A data base is merely an organized collection of information. For commodity traders the data base might

include any number of commodities and contracts, prices, volume, open interest and a variety of fundamental information.

YES, FUNDAMENTAL!!

Just because we use a computer doesn't make us technical traders. Fundamentals can be stored, tracked and analyzed using micro's. "Fundamentals" refers to supply and demand conditions while "technical" refers to prices, volumes, open interests and their various actions.

In developing a data base we bump into the same considerations we encountered in determining memory size, money and time. It is possible to build your own data base if your software is so designed. This method saves money but costs time. On the other hand some firms may sell data tapes as well as packaged software. Buying your data base obviously costs money but it does save time. A third alternative is to buy a software package like CMA1. which allows you to build your data base plus update it as often as necessary. Then, by purchasing a selected number of historical data tapes and continuously updating them you have the most cost-effective method of building a very valuable data base.

It takes considerable effort to obtain the proper hardware and software, check them out and then buy or build a data base. But now we can direct our efforts into "research" designed to develop or improve a profitable trading strategy. That's a scary word to most of us, "research"! How do we do research and what does it mean? I will refer the reader to any general book on futures trading and will recommend THE COMMODITY FUTURES GAME: WHO WINS? WHO LOSES? WHY? by Tewels, Harlow and Stone and the more recent COMMODITY TRADING SYSTEMS and METHODS by Kaufman. Check your local library or bookstore.

For this article I will only list some of the research features available using the software package, CMA1. and a TRS-80 Level II with 16K Ram. Generally the user can examine the data base using price charts, price lists, spread charts and lists, ratio charts and lists, trend lines on any price, spread or ratio chart, moving averages (any number of days) on prices, spreads or ratios in chart or list form, point and figure charts with box size and reversals set by user, percentage filters on trends or moving averages and more. The programs take the user from start to finish in performing these operations. The program does not tell you what the information means or how to create a profitable strategy. The trader is presumed to know what a moving average is or what a point and figure chart is. The ultimate value of CMA1. and other packages like it is that they allow the trader to study more than one commodity in depth. In fact they allow the trader to study any number of commodities very quickly, easily, and accurately. (Hint - diversification!) The computer does not transpose numbers, mess up a calculation, mis-read a chart, fall asleep, or get indigestion.

The astute trader will use his/her computer and its software for number crunching and will record those results using pencil & paper. A group of results can then be used to determine a profitable strategy or eliminate an unprofitable one.

In the old, wild West the Colt '45 was known as the "great equalizer". The microcomputer of today is the new "equalizer", at least in futures trading. At last the small speculator has the same kind of tools available to them as the big speculator has long had. All that is required is to use your micro's wisely, follow sound money management, and then combine the two into a profitable trading strategy.

THE COMPUTER AND GAMBLING

Putting the Odds on Your Side

by
M. R. DOWNING

A lot of people may wonder how the computer, especially the personal computer, can benefit the gambler. The answer is quite simple. The computer can take the advantage away from your opponents and give it to you. The most obvious example is the work done by Dr. Thorp with the game of blackjack. The result of his efforts, and the efforts of others refining his pioneering discoveries, have made a lot of blackjack players wealthier and a lot of pit-bosses nervous about certain people's playing habits. In fact, the use of the computer made Las Vegas change the rules. Blackjack may have been the first gambling game in which the use of the computer had this kind of impact, but I feel it won't be the last. Basically, that is the reason for the existence of this magazine. I think we are in the early days of discovering ways to use the computer to help us win and I don't want to see this knowledge lost to a lucky few. Besides, why should those of us interested in using our computers to aid us in gambling have to re-invent the wheel? An exchange of small bits of knowledge now may pay off big later on.

In the rest of this article I'll try to show my perspective on how the computer can be used to "get the odds on our side." I hope that these thoughts will inspire others to write down theirs and submit them to me for publication.

WHY THE HOUSE WINS

To begin with, one must have a basic understanding of why the house always wins. The house always wins because the popular casino games are formulated in their favor. The classic example is roulette. A \$1 bet on a single number in roulette returns the player \$36 if he wins. We say that the payoff odds are 35 to 1 or 36 for 1. (The "for" convention includes the wager, the "to" convention does not.) The catch is that there are 38 numbers distributed around the wheel. This means the player over the long run will pick a winning number once each 38 spins and will receive his 36 chips after placing 38 of them on the table. The two lost chips go into the pocket of the casino owner. This is the basic process used in all games such as craps, keno, wheel of chance, slot machines, etc.

PROBABILITY AND ODDS

In order to understand how to examine gambling games we must define the terms Probability and Odds. The Probability of winning a bet is simply the number of chances you have of winning divided by the total chances you have of winning plus losing or:

$$P = \frac{\text{chances of winning}}{\text{total chances}}$$

As an example consider a roulette player placing a \$1 chip on a single number. He has one chance in 38 of winning.

$$P = \frac{1 \text{ chance of winning}}{38 \text{ total chances}}$$

His probability of winning that \$1 bet is 1/38.

Now let's define the correct odds for a bet. The correct odds are one divided by the probability, minus one or

$$O = \frac{1}{P} - 1 \text{ to } 1$$

"Correct odds" means that neither the casino nor the player has an advantage. Thus for our example, the correct odds for the \$1.00 roulette bettor are:

$$= \frac{1}{1/38} - 1 = 37 \text{ to } 1$$

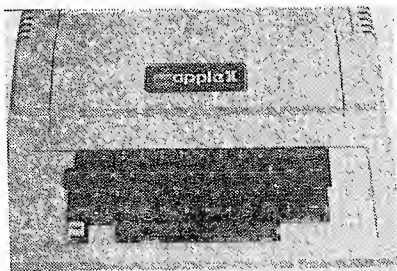
THE OVERLAY

Now, imagine a roulette game in which there are 38 bettors. Each bettor places a \$1 chip on a different number. Thus, 38 dollars are spread across the table. When the

winner collects his money at 35 to 1 (\$36) the casino collects \$2. This is because the correct odds are 37 to 1 and the casino is paying out 35 to 1. The casino has what is known as an "overlay." The odds the casino is collecting (37 to 1) are higher than what they are paying (35 to 1).

It can be simply stated that the goal of the computerized gambler is to use his computer to spot overlays. Thus, the computer user can be like the casino, betting only when he has an overlay.

Now, which gambling games lend themselves to sometimes having overlays which the player can bet on? At this point I wouldn't rule out any since such problems as where will a roulette ball land or which faces of dice will come up or where a wheel of chance will stop may be solved by some genius and his computer. If this doesn't jog a programmer's imagination, nothing will.



The very popular Apple Computer has met with great success largely due to their excellent color graphics and quality of packaging.

OVERLAYS IN SPORTS HANDICAPPING

The concept of betting on overlays can be applied to many forms of gambling and probably to the investment area as well. For example, one of the areas of gambling which is currently of interest to the computer enthusiasts is sports betting. Betting on the outcome of sporting events seems to be gaining in popularity among computer enthusiasts because the job of analysing the statistical data for teams is a perfect application for a computer. There is at least one such program on the market, *Pro Football*, by Ken Perry, which is available for the Apple computer. Write to System Design

Labs, 2612 Artesia Blvd., Suite B, Redondo Beach, Calif. 90278.

Since, generally speaking, establishments which book sports bets pay 10-11 odds we can work backwards to determine where the probability break is. Thus

$$1/p - 1 = .909 \text{ to } 1$$

$$P = 1/1.9 \approx .5238$$

Thus our probability of winning a particular sports bet must be greater than .5238 to have an overlay. Therefore, you would want to write a computer program which, based on the historical data, yielded the probable win values for a given point spread.

Thus, for example, if you were analysing the Rams vs the Cowboys and were required to give 3 points if you bet on the Cowboys you would ask the computer: "All right, computer, what is the probability that the Cowboys will win by more than 3?" If the answer was .6 then you have an overlay and a good bet. If the answer is .4 don't bet. As you can see, if you always bet the overlays on sports you would win more than 52.38% of your bets, yielding a profit over the money lost. For example, if I bet \$10 ten times on a probable win value of .6, I'll lose \$40., and win $.909 \times \$60 = \54.54 , for a net gain of \$14.54.

There are equations which allow you to optimize the return in overlay betting which I will describe in a future article.

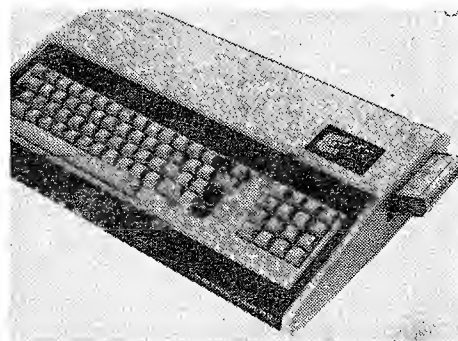


Commodore's PET Computer. This attractively packaged personal computer was a pioneer in the self-contained style. When they first hit the market, the wait was several months to obtain one due to the tremendous demand. It is 6502 microprocessor based

THE COMPUTER AND POKER

Some work I would like to see done is an analysis of poker. At any given time in a poker game the amount of money in the pot represents the odds you will get if you win. For example, if there is \$40 in the pot and \$10 is what I have wagered, the payoff odds are 3 to 1. Therefore if the hand I'm holding has a probability of winning of greater than .25 I have an overlay. I think there may be room here for some programs to be written to analyse poker from this perspective. Those of you interested in poker, let me know.

In order to gain overlays in roulette one would have to be able to eliminate a few of the numbers from consideration for a given spin. I believe Dr. Thorp has done some work in this area. We hope to be hearing from him!

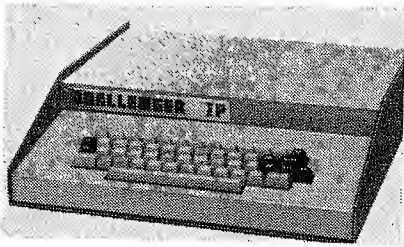


The Sorcerer by EXIDY. This Z-80 based home computer sports software available in ROM cartridge form (note the cartridge plugged into the side). This saves the sometimes frustrating task of loading programs from cassettes.

THE COMPUTER AND HORSE RACING

Horse racing intrigues me because the payoff odds are not set by rule as in roulette or craps. They are determined by the betting patterns of the crowd participating in the pari-mutual pool. When I was nine years old my father pointed to the crowd in the grandstands at Del Mar and told me that I would have to be smarter than all those people to win at horse racing. Now I have a computer and most of the crowd doesn't. I hope that makes me smarter.

I won't explain the details of how pari-mutual betting works since that is a subject better explained by people such as John Scarne in



Ohio Scientific's Challenger IP. It is just that — challenging the TRS-80 for the low end of the consumer market. This computer is an example of a home computer which can be purchased without the video monitor. It connects directly to your television.

The Complete Guide to Gambling, and others. It is sufficient to know that the payoff odds on each horse are displayed on the tote board, and are continually updated right up till the horses leave the gate. In fact, the track computer doesn't even display the final odds until after the race has started. However, my experience shows that the odds do not vary significantly with respect to my selection systems over the last 3 to 5 minutes before the race.

From my point of view, the whole idea of using a computer to handicap is to spot overlays. Since the odds are set at the whim of the crowd, we can conclude that overlays do occur. The problem is solely to determine which horses are over-laid and which are not.

If you have a computer, there are two ways to do this — write your own program or buy someone else's. In my opinion, computer software which handicaps race horses is inferior unless it yields the win probability for each horse in the race. I have written a program which does exactly that for thoroughbred sprint races (less than one mile). I am presently evaluating how effective it is. As soon as all the "bugs" are out of it and I determine that it will win more money than it loses, I will offer the program on the market.

It is written in Radio Shack TRS-80 level II basic and uses about 8k of memory. I will have cassettes available for the TRS-80, OSI, PET, and other popular personal computers. I hope to release it in early 1980. So the easiest way to use your computer for handicapping will be to buy my program and bet the overlays!

How do you write a handicapping program? My approach is to start with the assumption that the ultimate goal is to obtain the win probabilities for each horse in the race.

One way of approaching this is to find a book written by someone who has done that and write your program based on his system. This makes the system much easier to use since there are no tables to look up, math to do, and the Racing Form information is encoded directly with a keyboard, rather than having to write things down. This also allows high-speed evaluation of a system if you incorporate a data base of past races.

The computer can read through the data base and very quickly tell you the return on a fictitious investment. I think we will see several of these type programs come on the market over the next few years.

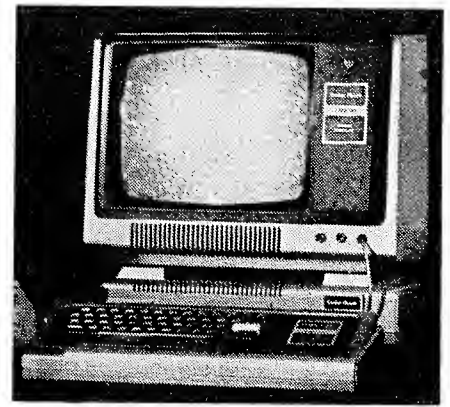
There are probably as many ways to write a handicapping program as there are programmers. There have probably been many excellent programs written, and if you know about any please let me know about them. One of the techniques I use matches a horse in a race with similar horses which have run in similar races. The percentage of races that the similar horses have won is assumed to be the win probability.

The process of determining which characteristics of horses are the best for use and how to group them into a data base requires at least two programs; first, a data base reduction program which you use to transfer racing form data to your storage media, and second, a statistics and sorting program which groups the characteristics and calculates the associated win probabilities based on the won/loss record.

The handicapping program itself then, classifies the unknown horses based on the library groups calculated by the statistics and sorting program.

DATA BASES

I will have future articles describing several statistics and sorting programs and hopefully we can decide on some standard data structures for reducing racing form



Radio Shack's TRS-80 Microcomputer. Over 100,000 of these Z-80 microprocessor based machines have been sold. Radio Shack recently lowered the price on these units.

data. This could hopefully lead to the interchange of data bases among our readers. This applies to sports handicapping, the stock and futures market, etc. Write to me and let me know what kind of data bases you are interested in.

I hope this article has stirred some people up enough to send me their own thoughts. I know we have some college professors as readers and I'm sure they are anxious to sling some probability theory and equations our way. I'm looking forward to the dialogue. Keep in touch and don't bet unless the computer says it's OK!

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THE PERSONAL COMPUTER AS A BLACKJACK TUTOR

by
Philip C. Pilgrim
DISCOVERY BAY SOFTWARE
P. O. Box 464
Port Townsend, WA 98368

One of the ways the computer can help put the odds on your side is to help you improve your gambling skills. WIN21 is an incredible program — I can't say enough good things about it. It even has a mode in which it will play with itself and show you the cumulative profits from Dr. Thorp's system.

Phil has done a very thorough job in covering all the possible options various casinos use. Using this program is the best way to learn Dr. Thorp's system without an instructor. It is an excellent way to practice. I let mine run by itself all night and can see the total profits in the morning. Good work, Phil! — *Editor*

Ever since Edward O. Thorp published his now-classic book, *Beat the Dealer*, the public's interest in acquiring "professional level" blackjack skills has surged. Many have successfully put Thorp's methods into practice using only the book as a guide; others have resorted to individual instruction from master players. Now, with the personal computer becoming a readily available item, another technique is possible and widely accessible: Computer-assisted instruction (CAI).

While no computer program can match the individualized teaching provided by an expert player, it is possible for such a program to give the user a level of precise and instant feedback unattainable in self-study. As a bonus, the student is treated to a trait rare in even the best human instructors: Infinite patience. With these possibilities in mind, I decided to produce a CAI program for blackjack, using Thorp's book as a foundation. The result is WIN21, written in Level II BASIC for Radio Shack's TRS-80.

The philosophy behind WIN21 is "learn-by-doing." From the beginning, the user is put into a casino playing situation and is expected to respond to the demands of that situation. This required writing the most realistic blackjack simulation possible, given the limited memory and graphics of the TRS-80. But because of the tremendous rules variations from casino to casino, realism had to be backed by flexibility. WIN21 provides this by allowing the user to configure the program to his own needs or level of mastery. This is accomplished by answering a set of questions flashed on the screen. Figure 1 illustrates those questions connected with player and rules options. The user may also select from four of Thorp's strategies to practice and five levels of coaching. To assist the user in these selections (and to guide his progression from basic play to more complex counting strategies), the manual accompanying WIN21 lays out a series of lessons, each defined by a set of

answers to the questions.

Once the questions are answered, play begins with placing the bets, and from there to the shuffle, deal, draw, and settlement. The student is faced with the same decisions he would confront in a casino — and the same probabilities of winning or losing. The difference lies in the coaching. Playing blackjack with WIN21 is like having an expert looking over one's shoulder and assisting whenever necessary. This "coach" can give instruction, just correct mistakes, or even do all the playing (autoplay mode), depending on how it's set up.

Figure 2 is a snapshot of the screen taken during a session with WIN21. The student is playing two hands, starting fourth slot from the right. (The other players just add a touch of realism and play a fixed strategy.) The first player (far right) has busted, the next two have taken hits, and now it is the student's turn. He has nine; the dealer has a jack showing. Does he hit or stand? After his attempt to stand,

(Continued on Page 13)

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the coach admonishes him to hit (bottom center), and this he must do before play can continue. Every correct decision the student makes helps his score (lower left: 1000 is perfect; every mistake decreases it, giving him a yardstick of his progress. In addition to the score, WIN21 keeps track of new winnings ("PROFIT", upper left) and total amount bet ("RISK"). As can be seen, not even the best strategies guarantee a profit; but they can increase its likelihood. Finally, the program indicates how

many cards remain in the deck (upper right), a figure that is used in practicing counting strategies.

Despite the completeness and flexibility of WIN21, one might legitimately ask, "Will the skills I acquire from using the program carry over to actual casino play?" Because most casinos contain more distractions than the typical home computer installation, some adaption to the "real thing" is necessary. But the pace of WIN21 is faster than that of the average Nevada dealer, perhaps compen-

sating for the lack of distractions. At least when it comes to card-counting, I've found the task much easier in a casino than in front of a CRT screen. On the other hand, until I got the feel for playing in a casino, my decisions took me longer there than with WIN21. So one might conclude that while there is no substitute for playing in a casino with real cards and real money, WIN21 can lay the foundation for this experience better than self-study and more inexpensively than a human tutor.

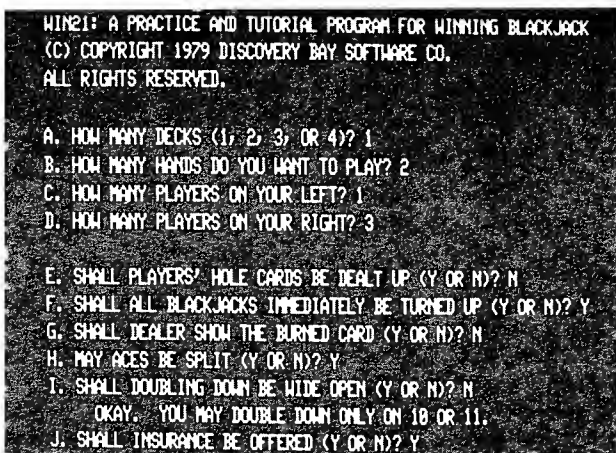


Photo by Bob Carter

Figure 1: Questions pertaining to player and rules options.

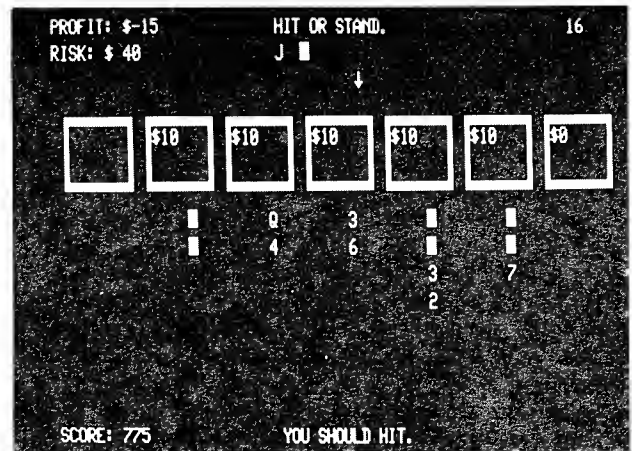


Photo by Bob Carter

Figure 2: Snapshot of a session with WIN21.

LETTERS . . .

Dear Sir:

Yes, I'm interested! I am currently putting the finishing touches on a database system to maintain price quotes. It is my intention to follow perhaps 50 stocks. My computer is an Altair (vintage grade) running CP/M — sadly on one drive only. I have a Polymorphics video display with graphics (barely) and hard copy in the form of a TI thermal printer.

As a siesmologist, I have a great deal of experience with signal processing (FFT and correlations), but limited knowledge of statistics. I follow the market through the *Wall Street Journal* and *Barrons*, but am rather green and apprehensive about risky investments — but believe that's the best way to make money.

Sign me up for your newsletter please. I think the idea has great promise.

Sincerely,
Glenn D. Nelson
Menlo Park, California

Dear Sir:

I am interested in your proposed newsletter, and am enclosing \$1 for the first issue. I would suggest that the emphasis be placed on analysis of games in which it is theoretically possible to maintain a positive expectation. This, of course, excludes most casino games. The one casino game which can be beaten, blackjack, has already received a great amount of work and publicity from

computer programmers. I would like to see the major emphasis placed on games such as horse racing, the stock and options market, commodity futures, and sports betting.

Perhaps the publication costs could be borne primarily by those who wish to receive the newsletter without contributing. Contributors could then receive subscriptions free or for a nominal charge.

Best of luck with this endeavor. I hope it is successful.

Sincerely,
Steve Sizemore
El Cerrito, California

LETTERS . . .

Dear Sir:

I am responding to the notice I recently came upon in the August issue of *Byte* concerning the start of a newsletter concerning computer applications to gambling systems, etc. I am enclosing \$1 for the first issue. Presuming that the content will be fairly meaty, this seems to be a reasonable charge per issue.

I own and work with a Z-80 (Exidy) with 16K RAM, and I teach gambling theory at York University in a math course. I would be especially interested in Z-80 assembly language programs that are useful in simulating or analyzing gambling systems. However, my interests don't stop there, and any substantial work on microcomputer applications to gambling and stock market and futures speculation would be interesting to me.

I look forward to seeing the first issue of your newsletter.

Yours very truly,
R. Allen Cobb
Downsview, Ontario, Canada

Dear Sir:

Here's my buck for your first issue of your newsletter.

As a novice in computer techniques and related subjects, I feel any suggestions from me concerning formats, rates, etc., of your newsletter would be a minus. However, I am seriously interested in all forms of gambling systems analysis.

So, please keep me informed and list me as an enthusiastic supporter.

Yours truly,
Louis F. Tyler, Jr.
Baltimore, Maryland

Dear Sir:

I think your idea of a newsletter for compute oriented investors is a good one. I'm primarily interested in the stock, bond, option and commodities markets. A need exists for more information on the availability of equipment, software

packages, data bases of current information, as well as providing the functions of a clearinghouse for distributors of market oriented products.

Enclosed is my check for \$1 for the first edition of your newsletter.

Yours truly,
George W. Reece, Jr.
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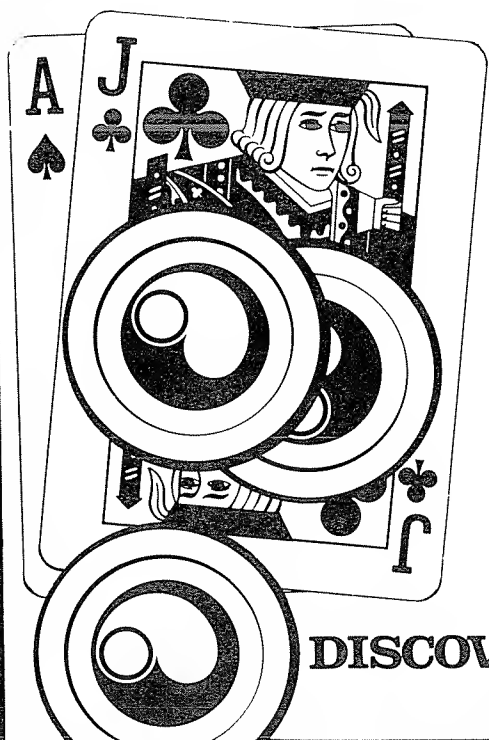
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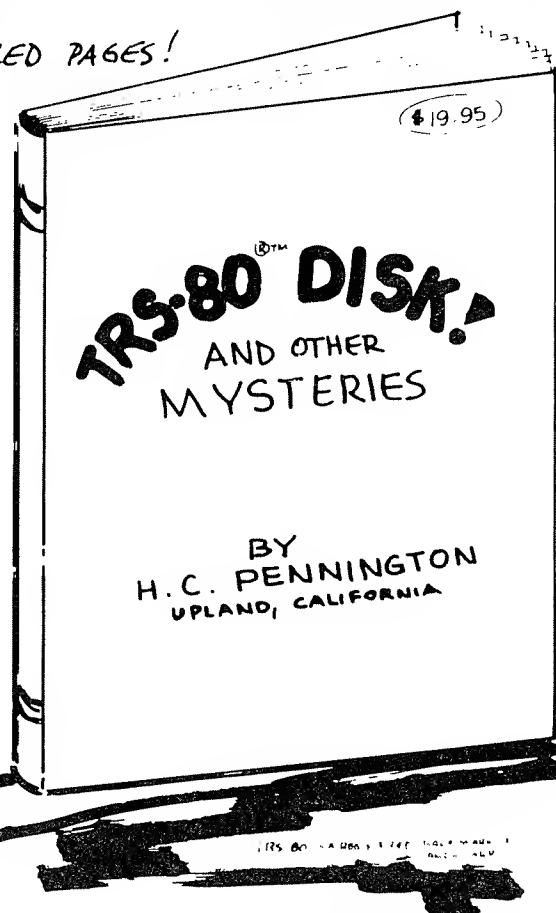
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